

Williston Korner Kwik Stop
Route 2
Williston, Vermont 05495

SMS Site #95-1822

A Facility Owned By:

Bradford Oil Company
P.O. Box 394
Bradford, Vermont 05033
(802) 222-5250
Contact: Mr. Bill Sellinger

Prepared By:

Lincoln Applied Geology, Inc.
RD #1 Box 710
Bristol, Vermont 50443
(802) 453-4384
Contact: Mr. Rick Vandenberg

October 31, 1995





October 31, 1995

Mr. Richard Spiese
Acting Supervisor
Sites Management Section
Vermont Department of
Environmental Conservation
103 South Main Street
Waterbury, Vermont 05676

RE: Expressway Summary Report, Williston Korner Kwik Stop, Williston, Vermont
(Site #95-1822)

Dear Mr. Spiese:

Lincoln Applied Geology, Inc. (LAG) is pleased to submit this Expressway Summary Report for the initial subsurface investigation of the Williston Korner Kwik Stop site located on Route 2 in Williston, Vermont. In response to the discovery of soil contamination during the tank removal operations of June 27 - 30, 1995 a Site Investigation Expressway Notification was submitted to your office. An Underground Storage Tank Removal and Closure report dated July 6, 1995 was also submitted by LAG.

LAG visited the site on September 5 and 11, 1995 to perform the following tasks: installation of three monitoring wells, ground water level and photoionization detector (PID) headspace monitoring of the three wells and the existing recovery well; collection of ground water samples from the four on-site wells for BTEX and MTBE analyses via EPA Method 8020; conductance of a stadia survey of the four on-site wells; and a contamination assessment with delineation of any nearby potential receptors.

Results of the initial site investigation indicate that ground water from two of the four sampled wells has been impacted (one considerably) by BTEX exceeding the Vermont Ground Water Quality Enforcement Standard (GWQES). MTBE concentrations exceeded the GWQES in one ground water sample. The current well array is not capable of detecting a release of contaminants to the adjacent wetland. We therefore recommend that three additional monitoring wells be installed and sampled.

Enclosed for your information and use in reviewing this report and recommendations are the following tables, figures, and appendices:

Table 1,	Ground Water Elevation/Product Level;
Table 2,	Headspace PID Assays;

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Table 3,	Ground Water Quality Results;
Figure 1,	General Location Map;
Figure 2,	Ground Water Contour Map for September 11, 1995;
Figure 3,	Ground Water Quality Map for September 11, 1995;
Figure 4,	Proposed Monitor Well Location Map;
Appendix A,	Adams Engineering and LAG Boring Descriptions;
Appendix B,	Analytical Laboratory Reports; and
Appendix C,	Cost Estimate for Proposed Work.

Site Location and History

The Williston Korner Kwik Stop, an operating retail grocery store with self-service gasoline pumps is located on the northwest corner of the intersection of U.S. Route 2 and North Williston Road in Williston, Vermont as shown on the General Location Map presented as **Figure 1**. The site is at an elevation of about 500 feet above mean sea level (MSL). A wetland to the northwest of the site discharges to Allen Brook which eventually enters the Winooski River. As shown on **Figure 4** a residence abuts the site on the west, a church lies across the street to the east, and residences sit across Route 2 to the south. The store, garage, the on-site ground water monitor wells, the present and former location of the USTs, and the pump island are shown on the Proposed Monitor Well Location Map presented as **Figure 4**.

During the recent removal of the four tanks (and replacement with new tanks) soil contaminated to a depth of 12' was observed (based on headspace PID assays greater than 500 parts per million (ppm)). One gasoline tank was in poor condition with an obvious hole. The tank (3,000 gallon gasoline) had been taken out of service in March or April 1994. Small amounts of free phase product were noted on ground water (6 - 10 feet below surface) during the excavations. This ground water was sampled and analyzed and found to contain very high concentrations of BTEX and MTBE. As a result, ground water had to be pumped from a recovery well (DW-2), treated with activated carbon, and discharged to the storm sewer during the tank removal and replacement. A permit to proceed with this discharge was obtained from the Wastewater Management Division.

Approximately 300 yds³ of contaminated soil has been stockpiled on the Denny Lewis Farm in Williston. All appropriate procedures were followed including a July 24, 1995 letter to you detailing the operation.

This gasoline station was also the site of an underground petroleum product releases in the late 1980's. Due to vapors in the basement a soil venting system was



installed and operated in 1988 - 1989 to prevent gasoline fumes from impacting the store basement and to remediate the spilled product in the soil. After vapor concentrations declined the system was shutdown. No ground water remediation or long-term monitoring was carried out.

Geology and Hydrogeology

The three soil borings encountered variable textured deposits of sand, silt, gravel, and clay from just below the surface to the maximum drilled depth of 9.5'. Boring logs from both Adams Engineering and LAG are included as **Appendix A**. PID assays of the soil were all at background for MW-1 and MW-3 near the edge of the site, but 20 ppm to saturated levels were encountered at MW-2 which is located between the tanks and the pipe island. Monitoring wells were installed near the bottom of each borehole and were screened to within two to three feet of the surface.

Bedrock beneath the site is mapped on the Centennial Geologic Map of Vermont (1961) as the Cambrian Fairfield Pond member of Camels Hump group. These rocks generally consist of a greenish quartzite schist. Bedrock was not encountered during this Expressway Investigation so this can not be confirmed.

Based on the drilling information obtained, a shallow ground water system exists beneath the site and the entire area. This system likely discharges to the downgradient wetland (during periods of high water table). The presence of sands and gravels in the upper part of the aquifer further suggests that ground waters probably migrate rapidly. Because the wetland is intermittently dry, ground waters do not discharge to it throughout the year. During these dry times ground water and/or contaminants may migrate beneath the wetland to the north.

Ground Water Level and Headspace PID Monitoring

On September 5, 1995 LAG conducted a top of casing (TOC) stadia survey of the three ground water monitor wells (MW-1, 2, and 3) and the dewatering well (RW-1) on the site. Depth to ground water below TOC and the PID level of vapors in each well headspace were measured on September 11, 1995. Ground water was found on that day to vary from about 4 to 6 feet below ground level. Detailed ground water elevation data is presented in **Table 1**, and PID assays are included in **Table 2**. Review of **Table 2** indicates that background (BG) to saturated lamp levels of vapor phase contaminants were detected in the headspace of the on-site wells. This data correlates with the soil headspace data collected during the soil borings.



Ground water elevation data was used to develop a ground water contour map presented as **Figure 2**. Review of **Figure 2** indicates a north-northeast ground water flow direction on-site, with a ground water gradient of 0.013 feet/foot between MW-3 and MW-1. This indicates that any contaminated ground water will likely flow toward the adjacent wetlands.

Ground Water Sampling

Ground water samples were collected from monitor wells MW-1, MW-2, MW-3, and the dewatering well RW-1 on September 11, 1995. The samples were analyzed along with a trip blank for BTEX and MTBE via EPA Method 8020 at the Green Mountain Laboratories in Middlesex, Vermont. The results have been summarized in **Table 3**, and copies of the laboratory reports are included as **Appendix B**. Review of **Table 3** and **Appendix B** indicate that the ground water sample from MW-2 is highly contaminated with BTEX (25,000 part per billion (ppb)) and the other two monitoring wells contained low (<10 ppb) levels of the gasoline constituents BTEX and MTBE. The dewatering well RW-1 contained moderate levels of dissolved BTEX and MTBE (about 1,000 ppb each).

Results obtained for RW-1 during the UST removal dewatering operation show that the ground water surrounding the USTs was highly contaminated with BTEX and MTBE. A copy of these results are attached in **Appendix B** and labeled DW-2 (dewatering well #2). Based on these results it seems likely that contaminated ground water has probably migrated off-site toward the adjacent wetland and should be further evaluated with additional monitor wells.

Evaluation of Receptor Impacts

On September 5, 1995 the potential receptors surrounding the site were surveyed to determine if any are threatened by the Korner Kwik Stop contamination. The survey revealed that only the soil, ground water, and an adjacent wetland are impacted and/or threatened. There are no private drinking water wells within 0.5 miles of the site. Based on the current ground water flow data no basements are threatened either.

Conclusions

Based on the observations and evaluation presented, the following conclusions are made:

1. Four gasoline USTs and associated delivery piping were excavated and



removed from the site from June 27 - ~~30~~, 1995.

2. One of the tanks (3,000 gallons gasoline) was in poor condition with a 2 centimeter hole indicating that a release was occurring from this tank until it was taken out of service in March or April 1994.
3. High levels (saturated lamp) of gasoline related soils contamination were detected by PID during excavations in the UST area. Soils were stockpiled off-site.
4. Depth to ground water below grade ranged from 4 - 6 feet.
5. The ground water flow direction on-site is north-northeast toward a swale and wetland at a gradient of 0.013 feet.
6. During dewatering of the excavation, ground water contained very high concentrations of BTEX and MTBE. Ground water samples obtained recently from MW-2 in the center of the site contained very high levels of BTEX. Other ground water monitoring points near the property lines ranged from 10 to 1,000 ppb BTEX. These data suggest that some contamination has migrated downgradient and off-site.

Recommendations

As a result of this limited subsurface investigation, the following recommendations are made:

1. Install two ground water monitor wells on-site between the tank area and the wetlands. A third monitor well is recommended off-site on the adjacent church parking lot property. **Figure 4** shows the location of these proposed monitor wells.
2. Conduct a confirmatory monitoring and sampling survey after installing the three new monitoring wells.
3. Analyze the headspace of soil samples from the stockpiled soils every six months. After concentrations have reached or approached background levels, collect samples for laboratory analysis. If the soil meets closure requirements they will be thinspread.



Mr. Richard Spiese
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4. Submit a summary report with conclusions and recommendations.

Appendix C contains our anticipated costs to complete this work. Please contact me or Rick Vandenberg, Site Manager, with any questions or comments you may have at (802) 453-4384.

Sincerely,



Alan Moore, P.E.
Project Manager

ATM/smk
enclosures
cc: William Sellinger



Project: Williston Quick Stop
Location: Williston, Vermont

Table 1
VDEC Site # 95-1822
Sheet 1 of 1

Ground Water Elevation/Product Level (feet)

Data Point	TOC	05/03/95	09/11/95					
MW-1	98.34	95.14	94.69					
MW-2	100.28		95.47					
MW-3	102.47		96.41					
RW-1	100.00		95.88					
TMW-1			4.52					
TMW-2			5.05					
TMW-3			5.16					
TMW-4			4.66					

Notes:

- 1 - Elevation datum assumed
- 2 - Reference elevation is elevation of top of PVC well casing
- Light Grey Cell = DRY
- Dark Grey Cell = Inaccessible

Project: Williston Quick Stop
Location: Williston, Vermont

Table 2
VDEC Site # 95-1822
Sheet 1 of 1

Photoionization Results (PID - ppm)

Data Point	05/03/95	09/11/95						
MW-1	BG	0.2						
MW-2		SL						
MW-3		6.8						
RW-1		BG						
TMW-1		BG						
TMW-2		BG						
TMW-3		BG						
TMW-4		BG						

Notes:
BG - Background
SL - Saturated Lamp

Ground Water Quality Results (ppb)

Data Point	06/28/95	06/30/95	09/11/95				
DW-2	17,600 68,090						
DW Influent		3,210 8,229					
DW Between		92.3 72.1					
DW Effluent		<10 18.2					
MW-1			8 9.3				
MW-2			<1,200 25,000				
MW-3			<5 10				
RW-1			910 910				
TRIP			<5 <6				

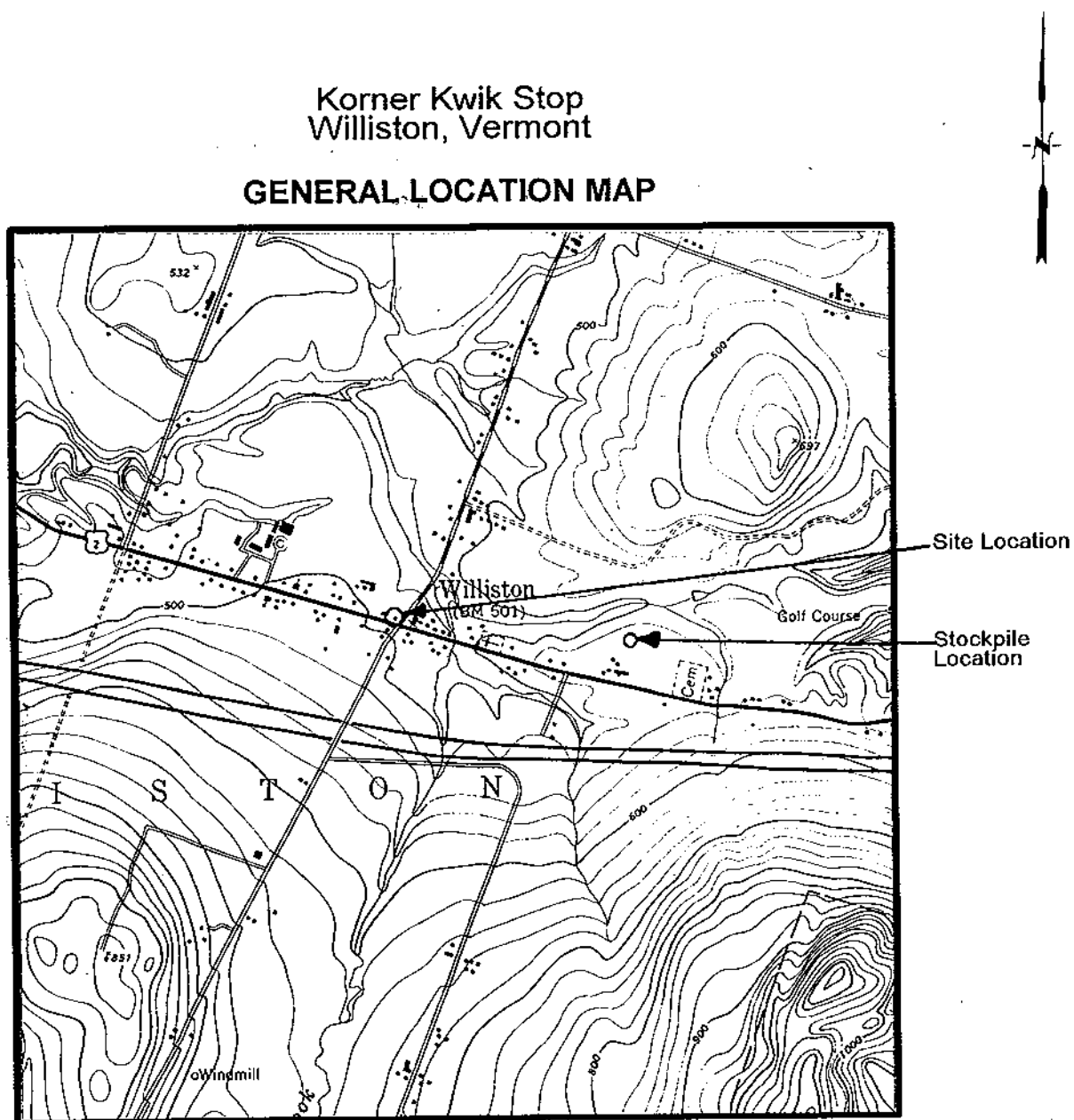
NOTES:

MTBE in upper right corner of cell

BTEX in lower left corner of cell

< - Contaminant not detected at specified detection limit

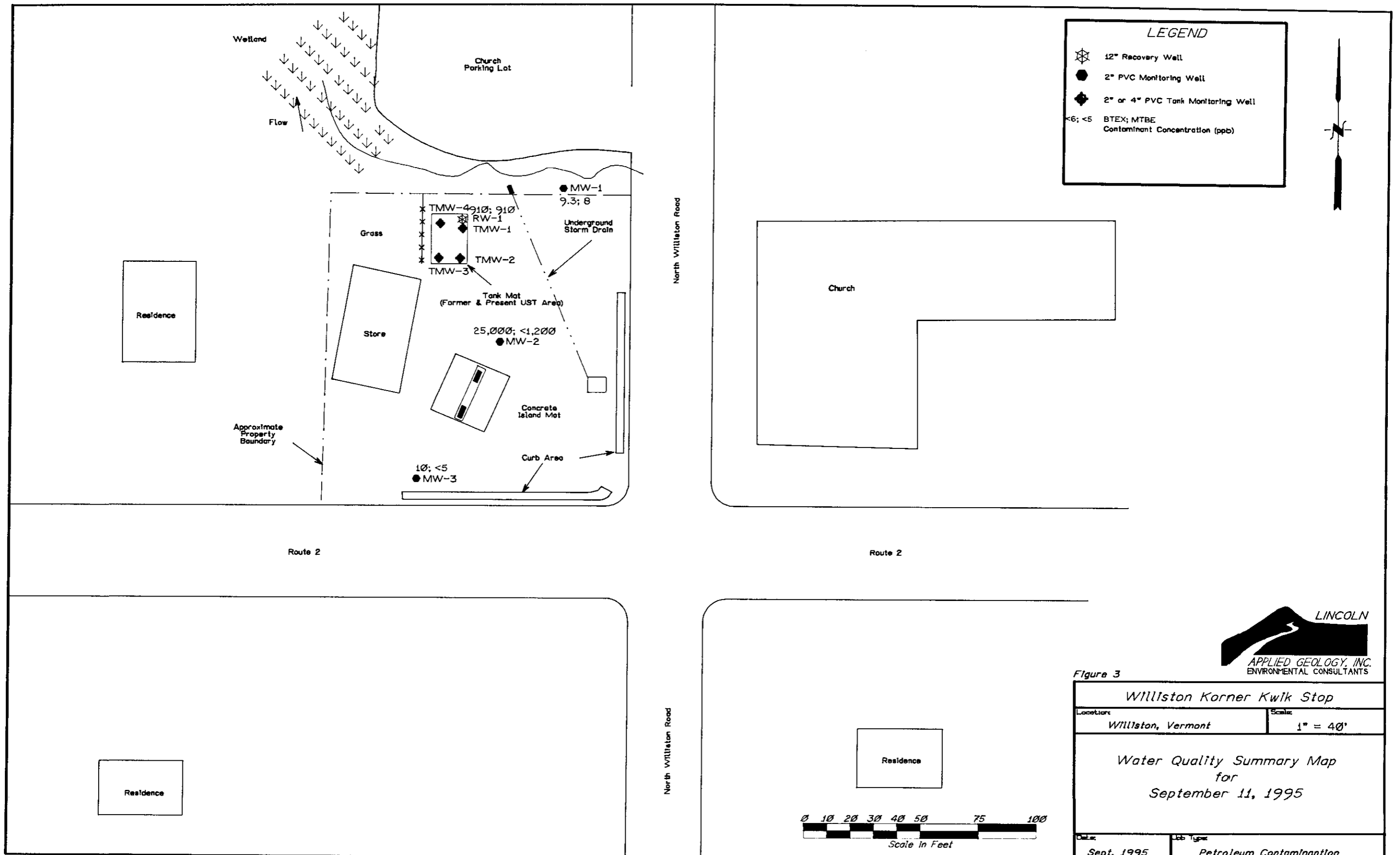
Figure 1

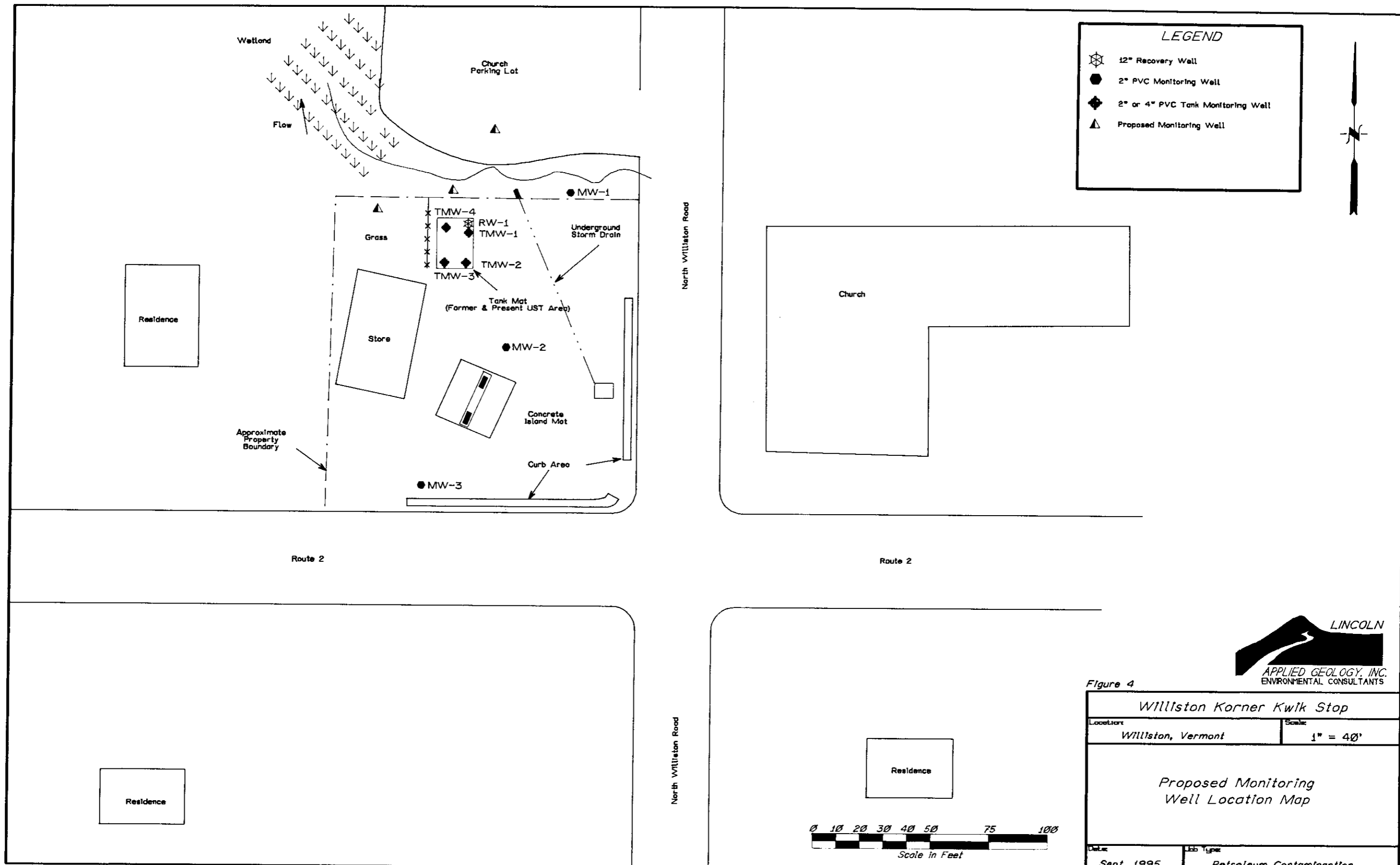


Source: U.S.G.S. 7.5 Min
Topo Series
Essex Junction, VT Quad.

Scale: 1" = 2,000'







LINCOLN
APPLIED GEOLOGY, INC.
 ENVIRONMENTAL CONSULTANTS

Figure 4

Williston Corner Kwik Stop	
Location: Williston, Vermont	Scale: 1" = 40'
Proposed Monitoring Well Location Map	
Date: Sept. 1995	Job Type: Petroleum Contamination

Appendix A

Geologic Logs

ADAMS ENGINEERING
Gerard Adams
RD #1, Box #3700, Underhill, VT-05489

September 6, 1995

Mr. Rick Vandenberg

Lincoln Applied Geology

Well Logs: Corner Quick Stop/ Williston

Manways cemented in place drilled with 10" auger with 4" pilot to -1.5'; sampled with polyethylene (PE) lined 5' X 2.375" ID NQ sampler vibrated to depth, pulled & sample vibrated from casing in PE liner for examination; well with slip cap to create annulus & sandpack vibrated to depth in backfilled borehole left by sampler; bentonite slurry placed in open hole. Wells developed with peristaltic pump using dedicated PE suction hose, clean slow recovery.

9/5/95 MW #1

SOILS WELL

G. Manway.

0 > -5.0' Brown gravelly sand fill // (over) gray silt clay becoming saturated.

-.3' Top well 2" solid riser.

-1' Top powdered bentonite.

-1.3' Bottom bentonite, top sand pack placed in open borehole.

-1.5' Top well screen, 1.5-5' X 2" X .010" slot screens.

-5.0.10.0' Saturated gray silt/clay.

-6' Bottom sand pack, top collapsed native soils.

MW #2

G. Manway.

0 > -5.0' Black top//white limestone fill//gray silt//clay becoming saturated.

-.3' Top well 2" solid riser.

-1' Top powdered bentonite.

-1.2' Bottom bentonite, top sand pack placed in open borehole.

-1.5' Top well screen, 1.5-5' X 2" X .010" slot screens.

-5.0.10.0' Poor recovery dark gray silt & stones.

-8' Bottom sand pack, top collapsed native soils.

-9.0' Bottom well screen.

MW #3

G. Manway.

0 > -5.0' Black top// gravel fill//dry silty fine sand.

-.3' Top well 2" solid riser.

-1' Top powdered bentonite.

-1.5' Bottom bentonite, top sand pack placed in open borehole.

-4' Top well screen, 1-5' X 2" X .010" slot screens.

-5.0.10.0' Could not pull sampler, had to vibrate out partially destroying sample, saturated brown gravel & brown silt/clay.

-4' Bottom sand pack, top collapsed native soils.

-9.0' Bottom well screen, PVC point*.

*Well vibrated into place using EW rods inside well which may leave trace levels of toluene.

G. Adams

Gerard Adams

WELL LOG

WELL: MW-1
LOCATION: Williston Korner Kwik Stop
DRILLER: Jerry Adams
HYDROGEOLOGIST: R.S. Vandenberg, Lincoln Applied Geology, Inc.
DATE: September 5, 1995

Soils Description: (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0 - 1.7'	Sand, medium to fine, tan; some sand, fine; trace gravel.	BG
1.7' - 6'	Silt, light green to dark olive; and clay; some gravel, fine.	
6' - 9.5'	Sand, dark grey; some gravel, fine; some silt; trace clay.	BG

Well Construction:

Bottom of Boring: 9.5'
Bottom of Well: 9.0'
Well Screen: 7' sch. 40 PVC 10 slot 9 - 2'
Solid Riser: 0 - 2'
Sand Pack: Morie #1
Bentonite Seal: 1.5' to 1.0'
Backfill: None
Well Box: Flush grade bolt down

WELL LOG

WELL: MW-2
LOCATION: Williston Korner Kwik Stop
DRILLER: Jerry Adams
HYDROGEOLOGIST: R.S. Vandenberg, Lincoln Applied Geology, Inc.
DATE: September 5, 1995

Soils Description: (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0 - 0.32'	Asphalt	50
0.32' - 1.3'	Crushed limestone.	20
1.3' - 5.0'	Silt, light green to dark olive; and clay; some gravel, fine.	SL
5.0' - 6.0'	Sand, very coarse to coarse; some fine sand (ground water encountered at 5.0').	SL
6.0' - 9.5'	Silt, light green to dark olive; and clay; some gravel, fine.	100

Well Construction:

Bottom of Boring: 9.5'
Bottom of Well: 9.5'
Well Screen: 7.5' sch. 40 PVC 10 slot
Solid Riser: 2.0' sch. 40 PVC
Sand Pack: Morie #1
Bentonite Seal: 1.5' - 1.0'
Backfill: None
Well Box: Flush grade bolt down

WELL LOG

WELL: MW-3
LOCATION: Williston Korner Kwik Stop
DRILLER: Jerry Adams
HYDROGEOLOGIST: R.S. Vandenberg, Lincoln Applied Geology, Inc.
DATE: September 5, 1995

Soils Description: (BG = Background [0.2], SL = Saturated Lamp [>500], ppm = Parts Per Million)

<u>Depth</u>	<u>Description</u>	<u>PID (ppm)</u>
0 - 0.3'	Asphalt.	BG
0.3' - 4.2'	Gravel, coarse to fine, tan; some sand, very coarse to coarse; trace silt.	BG
4.2' - 5.0'	Silt, light green to dark olive; and clay; some gravel, fine.	BG
5.0' - 7.0'	Sand, very fine, light green to tan; some silt; some clay; trace gravel, fine.	BG
7.0' - 8.0'	Sand, very coarse to medium; some gravel, fine.	BG
8.0' - 9.5'	Silt, light green to dark olive; and clay; some gravel, fine.	BG

Well Construction:

Bottom of Boring: 9.5'
Bottom of Well: 8.0'
Well Screen: 5' sch 40 PVC 10 slot
Solid Riser: 3.0' feet sch. 40 PVC
Sand Pack: Morie #1
Bentonite Seal: 1.5' to 1.0'
Backfill: None
Well Box: Flush grade bolt down

Appendix B

Ground Water Quality Results



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Lincoln Applied Geology
PROJECT NAME: Korner Kwik Stop
REPORT DATE: July 3, 1995
DATE SAMPLED: June 28, 1995

PROJECT CODE: MAVT1411
REF.#: 76,336

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody did not indicate sample preservation.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

GC METHOD--BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)

CLIENT: Lincoln Applied Geology
PROJECT NAME: Korner Kwik Stop
REPORT DATE: July 3, 1995
DATE SAMPLED: June 28, 1995
DATE RECEIVED: June 30, 1995
DATE ANALYZED: June 30, 1995

PROJECT CODE: MAVT1411
REF.#: 76,336
STATION: DW-2
TIME SAMPLED: 6:00
SAMPLER: J. Revell

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	1,000	17,300.
Toluene	1,000	34,500.
Ethylbenzene	1,000	1,890.
Xylenes	1,000	14,400.
MTBE	10,000	17,600.

Bromobenzene Surrogate Recovery: 101%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at 0.1% dilution.

RR#3 Box 5210 P.O. Box 189
Montpelier, VT 05602

Ph. (802)223-1468 Fax (802)223-8688

Page

_____ of _____

MAV #

CLIENT NAME MicroAssays of Vermont

ADDRESS P.O. Box 189, Montpelier, VT 05602

PROJECT NAME LAG - Korner Kwick Stop

PROJECT NUMBER 11393

PROJECT MANAGER Rick Vandenberg

SAMPLER Jeremy Revell

MAVT 1511

$$\text{BTEX} + \text{MTBE}$$

RUSH!

RUSH!

[illegible]

Relinquished by:

Received by:

Date/Time

Relinquished by:

Received by:

Date/Time

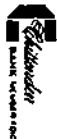
E. H. Hurl

Ben Gen

6/30/95 2:45 p.m.

MicroAssays of Vermont, Inc.

P.O. BOX 189
MONTPELIER, VT 05601



MONTPELIER,
VT 05601

58-6/116

NUMBER

CHECK NO. 2214

2214

PAY: ONE HUNDRED FIFTY DOLLARS

DATE
06/10/95

AMOUNT
*****\$150.00

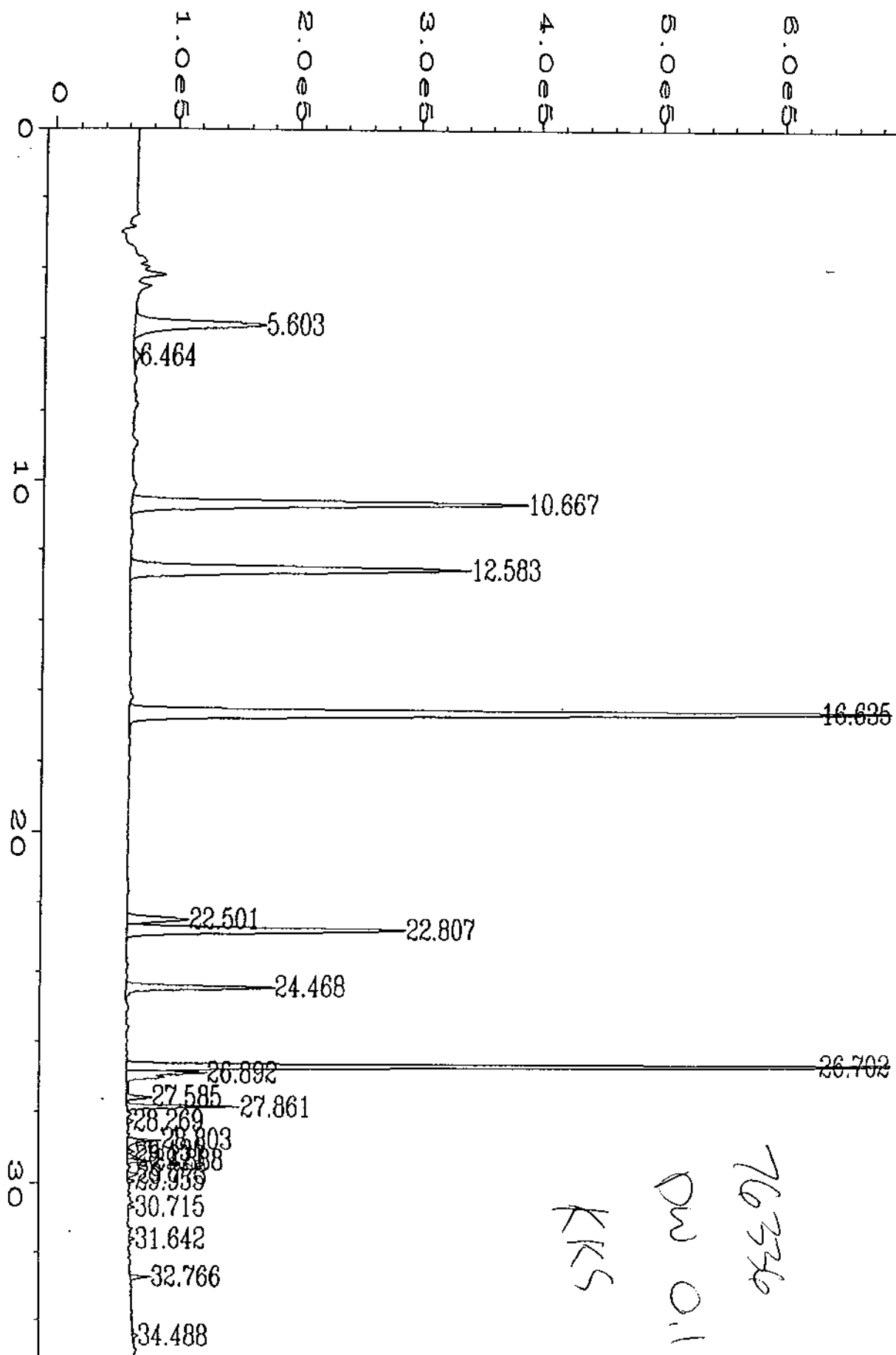
TO THE
ORDER
OF
ENDYNE, INC.
32 James Brown Drive
Williston, Vermont 05495

MicroAssays of Vermont, Inc.

AUTH. SIG.

⑈002214⑈ ⑆01600062⑆ ⑆08⑈57⑈1387⑈5⑈

Sig. 2 in C:\HP\CHEM\1\DATA\BARBC\031R0112.D



76334
Dm 0.1%
KKS

Internal Standard Report

```

Data File Name   : C:\HPCHEM\1\DATA\BARBC\031R0112.D
Operator        : John Elliott Lomas
Instrument       : BART
Sample Name     :
Run Time Bar Code:
Acquired on     : 30 Jun 95 05:51 PM
Report Created on: 30 Jun 95 06:26 PM
Last Recalib on : 26 JUN 95 07:01 PM
Multiplier      : 1
Page Number     : 1
Vial Number     : 31
Injection Number:
Sequence Line   :
Instrument Method: BARBC1.MTH
Analysis Method : BARBC.MTH
Sample Amount   : 0
ISTD Amount     :
  
```

Fig. 2 in C:\HPCHEM\1\DATA\BARBC\031R0112.D

Ret Time	Area	Type	Width	Ref#	ppb	Name
5.603	1587100	BV	0.221	3	17.562	MTBE
10.667	3792231	VV	0.177	3	17.254	Benzene
12.583	3607090	BV	0.202	3-I	30.000	IS
16.635	6755064	VV	0.167	3	34.503	Toluene
22.260	* not found *			3		Chlorobenzene
22.501	497843	BV	0.152	3	1.890	Ethylbenzene
22.807	2276426	VV	0.158	3	9.861	m&p-Xylene
24.468	989887	VV	0.127	3	4.548	o-Xylene
26.702	5302249	BV	0.086	3	15.201	Surrogate
28.269	32180	VV	0.094	3	-0.243	1,3 Dichlorobenzen
28.803	176328	VV	0.092	3	0.735	1,4 Dichlorobenzen
29.388	91165	VV	0.072	3	0.223	1,2 Dichlorobenzen

Not all calibrated peaks were found

Green Mountain Laboratories, Inc.

RR#3 Box 5210

Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

CLIENT NAME:	Lincoln Applied Geology	REF #:	0160
ADDRESS:	RD1 Box 710 Bristol, Vermont 05443	PROJECT NO.:	not given
SAMPLE LOCATION:	Williston Korner Kwik Stop	DATE OF SAMPLE:	9/11/95
SAMPLER:	Jim Holman	DATE OF RECEIPT:	9/11/95
		DATE OF ANALYSIS:	9/12/95
ATTENTION:	Rick Vandenberg	DATE OF REPORT:	9/13/95

Pertaining to the analyses of specimens submitted under the accompanying chain of custody form, please note the following:

- Water samples submitted for VOC analysis were preserved with HCl. The trip blank was prepared by the client from reagent water supplied by the laboratory.
- Specimens were processed and examined according to the procedures outlined in the specified method.
- Holding times were honored.
- Instruments were appropriately tuned and calibrations were checked with the frequencies required in the specified method.
- Blank contamination was not observed at levels interfering with the analytical results.
- Continuing calibration standards were monitored at intervals indicated in the specified method. The resulting analytical precision and accuracy were determined to be within method QA/QC acceptance limits.
- The efficiency of analyte recovery for individual samples was monitored by the addition of surrogate analytes to all samples, standards, and blanks. Surrogate recoveries were found to be within laboratory QA/QC acceptance limits, unless noted otherwise.

Reviewed by:

Arthur L. Rendell

Director, Chemical Services

Green Mountain Laboratories, Inc.

RD#1, Box 5210
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Williston Korner Kwik Stop	GML REF.#:	0160
REPORT DATE:	September 13, 1995	STATION:	Trip
DATE SAMPLED:	September 11, 1995	TIME SAMPLED:	7:30
DATE RECEIVED:	September 11, 1995	SAMPLER:	Jim Holman
ANALYSIS DATE:	September 12, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	ND
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 112 %

ND = Not Detected

Green Mountain Laboratories, Inc.

RR#3, Box 5210
Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Williston Korner Kwik Stop	GML REF.#:	0160
REPORT DATE:	September 13, 1995	STATION:	RW-1
DATE SAMPLED:	September 11, 1995	TIME SAMPLED:	9:50
DATE RECEIVED:	September 11, 1995	SAMPLER:	Jim Holman
ANALYSIS DATE:	September 12, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	390
Toluene	1	100
Ethylbenzene	1	10
Xylenes	3	410
MTBE	5	910*

Surrogate % Recovery: 102 %

*Note: This sample was rerun at a higher dilution to bring the concentration of MTBE within the linear range of the calibration curve.

Green Mountain Laboratories, Inc.

RR#3, Box 5210

Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Williston Korner Kwik Stop	GML REF.#:	0160
REPORT DATE:	September 13, 1995	STATION:	MW-1
DATE SAMPLED:	September 11, 1995	TIME SAMPLED:	10:10
DATE RECEIVED:	September 11, 1995	SAMPLER:	Jim Holman
ANALYSIS DATE:	September 12, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	4.1
Ethylbenzene	1	ND
Xylenes	3	3.2
MTBE	5	8.0

Surrogate % Recovery: 110 %

ND = Not Detected.

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LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Williston Korner Kwik Stop	GML REF.#:	0160
REPORT DATE:	September 13, 1995	STATION:	MW-2
DATE SAMPLED:	September 11, 1995	TIME SAMPLED:	10:42
DATE RECEIVED:	September 11, 1995	SAMPLER:	Jim Holman
ANALYSIS DATE:	September 12, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	250	3200
Toluene	250	9800
Ethylbenzene	250	2000
Xylenes	750	10000
MTBE	1200	ND

Surrogate % Recovery: 110 %

ND = Not Detected.

Green Mountain Laboratories, Inc.

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Montpelier, Vermont 05602

Phone (802) 223-1468

Fax (802) 223-8688

LABORATORY RESULTS

GC/MS METHOD - BTEX (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES) + MTBE

CLIENT NAME:	Lincoln Applied Geology	PROJECT CODE:	not given
PROJECT NAME:	Williston Korner Kwik Stop	GML REF.#:	0160
REPORT DATE:	September 13, 1995	STATION:	MW-3
DATE SAMPLED:	September 11, 1995	TIME SAMPLED:	10:21
DATE RECEIVED:	September 11, 1995	SAMPLER:	Jim Holman
ANALYSIS DATE:	September 12, 1995	SAMPLE TYPE:	Water

PARAMETER	PQL (µg/L)	Conc. (µg/L)
Benzene	1	ND
Toluene	1	4.5
Ethylbenzene	1	ND
Xylenes	3	ND
MTBE	5	ND

Surrogate % Recovery: 110 %

ND = Not Detected.

ANALYSIS REQUESTED

Page
1 of 1
GML #

B-Tex MIBZ

0160

[illegible]

1) Relinquished by: ~		Received by: 	Date/Time 9/11/95 11:13 AM
2) Relinquished by:		Received by:	Date/Time
3) Relinquished by:		Received by:	Date/Time

Appendix C

Cost Estimate



State of Vermont

Department of Fish and Wildlife
Department of Forests, Parks and Recreation
Department of Environmental Conservation
State Geologist
RELAY SERVICE FOR THE HEARING IMPAIRED
1-800-253-0191 TDD>Voice
1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street / West Building
Waterbury, Vermont 05671-0404
802-241-3888
FAX 802-241-3296

December 5, 1995

Rick Vandenberg
Lincoln Applied Geology, Inc.
RD #1 Box 710
Bristol, Vermont 05443

RE: Petroleum contamination at the Williston Korner Quick Stop
(Site #95-1822)

Dear Mr. Vandenberg:

The Vermont Department of Environmental Conservation, Sites Management Section (SMS) has reviewed the October 31, 1995 Expressway Summary Report that has been prepared for the above referenced site. This report provides a cost estimate for the installation of two additional groundwater monitoring wells between the tank area and the wetlands, and the installation of a third monitoring well offsite on the adjacent church parking lot property. The SMS approves of this workplan as submitted. This includes a total cost not exceed \$4,109.00.

Please keep the SMS informed of work scheduled to be performed at the site, as well as forwarding sampling and analytical results as they become available. The SMS looks forward to the completion of this work. Please feel free to call with any questions or comments.

Sincerely,


Jason Feingold, Project Engineer
Sites Management Section

CC: Bill Sellinger, Bradford Oil Company, Inc.

JPF:WP51/W_Q STOP/951822

**Williston Korner Kwik Stop
Williston, Vermont
Cost Estimate for Proposed Work
October 01, 1995**

Task 1 Monitor Well Installation and Supervision

Driller's Charges -					\$	1,451.00
Hydrogeologist/Site Manager -	10.0	hr(s) @	\$45.00	per hour	\$	450.00
PID and Interface Probe -	1.0	day(s) @	\$100.00	day	\$	100.00
Metal Detector -	1.0	day(s) @	\$30.00	day	\$	30.00
Mileage -	80.0	mile(s) @	\$0.30	per mile	\$	24.00

Total Task 1 \$ 2,055.00

Task 2 Sampling

Field Technician -	8.0	hr(s) @	\$30.00	per hour	\$	240.00
PID and Interface Probe -	1.0	day(s) @	\$100.00	day	\$	100.00
Generator and Pump -	1.0	day(s) @	\$110.00	day	\$	110.00
Bailer(s) -	8.0	@	\$6.75	each	\$	54.00
Laboratory Analyses (includes trip) BTEX & MTBE -	9.0	@	\$60.00	each	\$	540.00

Total Task 2 \$ 1,044.00

Task 3 Summary Report

Principal/Senior Hydrogeologist -	2.0	hr(s) @	\$75.00	per hour	\$	150.00
Project Manager -	4.0	hr(s) @	\$50.00	per hour	\$	200.00
Hydrogeologist/Site Manager -	10.0	hr(s) @	\$45.00	per hour	\$	450.00
Computer Technician -	3.0	hr(s) @	\$30.00	per hour	\$	90.00
Administrative Assistant -	4.0	hr(s) @	\$30.00	per hour	\$	120.00

Total Task 3 \$ 1,010.00

Total Tasks I, II, and III >>> \$ 4,109.00



Lincoln Applied Geology, Inc.
Environmental Consultants

RD # 1 Box 710 • Bristol, Vermont 05443 • (802) 453-4384 • FAX (802) 453-5399